

providing a means to change the relative position between the gas container with the test sample and a mass spectrometer in an enclosure for position resolved measurement of permeation;  
using a mass spectrometer to detect the partial pressure of the gas or vapour after permeation through the test sample;  
and estimating the rate of permeation position-resolved from the signal measured by a mass spectrometer.

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50. ORIGINAL An apparatus for measuring the rate of permeation of a gas or vapour (including water vapour) consisting of:  
one or more vacuum chambers,  
a gas container which is removable from the vacuum system,  
a filling facility,  
a mass spectrometer for partial pressure measurement,  
a means for changing the relative positions of mass spectrometer and test sample and  
a means of transferring the gas container with the test sample.

51. ORIGINAL The apparatus according to claim 50 having a gas container that can be filled by means of a filling facility provided in one of the vacuum chambers.

52. ORIGINAL The apparatus according to claim 50 with the investigation chamber is under HV, UHV or XHV conditions.

53. ORIGINAL The apparatus according to claim 50 where the gas container can be moved between vacuum chambers and removed from the vacuum chambers.

54. ORIGINAL The apparatus according to claim 50 where the size of test sample is less than a mm to a few mm in one or two dimensions.

55. ORIGINAL The apparatus according to claim 50 where the test sample is clamped or glued to the gas container.

56. ORIGINAL The apparatus according to claim 50 where the test sample is a film or a device or an assembly of several parts of a device.

57. ORIGINAL The apparatus according to claim 50 where the gas container contains gas or vapour including water vapour.

58. ORIGINAL The apparatus according to claim 50 where the pressure of the gas or vapour inside the gas container can be varied by means of a movable part for changing the internal volume of the gas container.

59. ORIGINAL The apparatus as claimed in claim 50 where the partial pressure is measured with the mass spectrometer after the signal has stabilised to a constant value.

60. ORIGINAL The apparatus according to claim 50 where the rate of permeation is estimated from the measured partial pressure and a calibration against one or more samples with a known rate of permeation.

61. ORIGINAL The apparatus according to claim 50 where the temperature of the test sample can be varied.

62. ORIGINAL The apparatus according to claim 50 where the mass spectrometer has an enclosure, which can be pumped.